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West Europe Report

SCIENCE AND TECHNOLOGY

No. 114

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WEST EUROPE REPORT

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CONTENTS

BIOTECHNOLOGY

SWISS FIRMS REPORT ON ACTIVITIES IN BIOTECHNOLOGY

Duesseldorf CHEMISCHE INDUSTRIE in German May 82 p 272

[Article: "Basel Chemistry Advances Biotechnology"]

[Text] At this year's annual-meeting press conference, both Sandoz and Ciba-Geigy reported in more detail than usual about their biotechnology research. Sandoz has been rooted in classical biotechnology for a long time through its subsidiary Biochemie GmbH, Kundl, one of the largest penicillin producers and most important ergot alkaloid producers. In the Sandoz Research Institute (SFI) in Vienna, a genetechnology group was established which is active in the field of immunization technology. Some of the researchers in this group concentrate on hybridoma technology; inside the seed companies, biotechnological research in the area of cell cultures is being further expanded.

In addition to its own research, Sandoz presses for joint ventures with outside companies. For hybridoma research, the Wistar Institute in Philadelphia was acquired as a partner, and another research agreement was concluded with the Native Plants Corporation in Salt Lake City, from which the company expects new impulses for its own investigations. Other cooperative agreements are presently being negotiated.

Ciba-Geigy on the other hand is placing its hopes on interferon which will go into clinical testing in 8 to 10 months, however, less for combatting cancer than for fighting virus diseases. Genetic technology work has stepped up during the past year.

Auelt will surely be able to hear a lot about the immunologically-effective protein at the pending year-end press conference of F. Hoffmann-LaRoche & Co.

9160
CSO: 3102/345

BRIEFS

HGH GENE CLONED--Paris--The genetic recombination laboratory located on the campus of the Institut Pasteur Production (IPP, of the Sanofi group) at Marnes-la-Coquette, has in its turn succeeded in extracting the human growth hormone (HGH) gene in E. Coli and animal cells; it relied on fundamental research carried out at Institut Pasteur and on research involving the cloning of HGH. The Sanofi announcement states that "the nature of the cells and the rate of extraction make it possible to anticipate a rapid industrial production of the hormone for therapeutical purposes," since the proposed hormone is identical to the one in man. Industrial production and marketing will be assured by IPP. [Text] [Paris CHIMIE ACTUALITES in French 7 May 82 p 5] 11,023

L-AMINO ACID PRODUCTION--In its Constance plant, Degussa has recently placed in operation an experimental installation for producing L-amino acids by a new process which uses a membrane enzyme reactor (REM). This process was perfected as part of the research project that has been subsidized since 1978 by the Federal Ministry for Research and Technology, and which also benefited from the participation of the Company for Biotechnologic Research of Brunswick-Stockheim, and the Center for Nuclear Research of Julich. The REM experimental installation makes it possible to manufacture as much as 5 t/month of L-isomers of the following amino acids: alanine, methionine, phenylalanine, tryptophan, and valine; the installation has been integrated into Degussa's existing production of L-amino acids. In the process, L-amino acids are obtained through biocatalytic reaction from D,L acetylated amino acids. Unlike the conventional fixed bed reactor with acylase fixed on a support, the new process introduces the enzyme in soluble form and performs the separation from the reaction solution by means of membranes, thus avoiding immobilization losses and reducing the consumption of enzymes. In addition, the process offers the advantage of continuous control of the enzyme concentration and of yielding an apyrogen solution. [Text] [Paris INFORMATIONS CHIMIE in French Apr 82 p 115] 11,023

CSO: 3102/334

BRIEFS

ICL MULTIMICRO SYSTEM--International Computers Limited Germany, Nuernberg. The multimicro computer system DRS 20 has been expanded by the Model 16, an interactive terminal system and by the Model 30, a multiterminal processor. According to the company, both models are based on modern microprocessor technology and make possible interactive dialog interrogation and remote data acquisition, transactions processing, program development and remote printer output. Users of ICL 7500 terminals can convert to the new ICL DRS 20 system. The interactive terminal DRS-20 Model consists of a 12-inch CRT with a freely moveable keyboard. The internal microprocessor logic permits a data exchange rate of 9,600 bits/second. The DRS-20 Model 30 includes a central unit with 256-kbyte memory capacity. Up to 24 CRTs and 8 printers can be linked to the computer, all via a single data bus. The price range of the 2 models, depending on configuration, extends from DM 7,500 for the standard version of the terminal system up to DM 180,000 for the multiterminal system equipped with 8 printers and 24 CRTs. [Text] [Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 4 Jun 82 p 7] 9160

SIEMENS FOUR-INCH WAFERS--Behind the technical advance demonstrated by the pretty girl is concealed the MYMOS process of Siemens AG. The new method employs projection exposure and a dry-etch process; the transistor channel length measures just 2 mm. With this process, the 8,000 transistors of the SAB-8085 microprocessor can be placed on 13.7 mm^2 (previously 23 mm^2) while using the new 4-inch silicon wafers in place of the earlier 3-inch type. The 29,000 transistors of the 16-bit SAB-8086 microprocessor can now be placed on 21 mm^2. The new SAB 8085 MY-A provides the user shorter switching times. [Text] [Wuerzburg ELEKTROTECHNIK in German 14 Apr 82 p 5] 9160

NEW BASF LARGE COMPUTER--A new main-frame computer of the 2-Mips class has been announced by BASF for the third quarter of this year. The computer, designated the 7/65, is air cooled and is distinguished by the use of highly integrated components (64k chips) which reduces the space requirement to about 1 m^2 and the power consumption to about 6 kVA. Microcoded, expandable to 8Mb mean memory and up to 8 channels--6 with data stream equipment, this computer offers high performance, especially for input- and output-intensive processing. Without modification, the CPU can be used with all present IBM operating systems, including DOS/VSE and MVS/SP. Thus, the new computer can be added to the computing center without hardware or software changes, and it contains as standard equipment the connector for the fast, rigid-disk storage system. [Text] [Essen ELEKTRO-ANZEIGER in German no 7, 1982 p 76] 9160

CSO: 3102/330

BBC DESIGNS OPTOELECTRONIC SENSOR SYSTEM FOR ROBOT

Duesseldorf VDI NACHRICHTEN in German 21 May 82 p 20

[Article by R. Tessmer: "Robots See 'Optoelectronically'"]

[Text] For several years, serially produced industrial robots have been finding jobs in the factory. They weld autos together, coat or paint materials, etc. They differ mainly in the control system which can be programmed by an attendant's leading the robot through a sequence of steps during the teaching phase. For this purpose, the robot's arm resistance is compensated during the "teach in" so that it can be guided by the operator while learning to use a conventional spray pistol, for example. Thus the programmer's experience relating to tool manipulation and job steps is automatically transferred to the robot's sequential controller. Today, technical development is supported by intensive research work which has reached a point where industrial robots can be made to see with optoelectronic sensors and microcomputers.

Of course, it is possible with video technology to transmit pictures, even in color; however, the observer himself has to be able so see. Scientists and engineers at Brown, Boveri and Cie (BBC), Mannheim, have succeeded in developing an optoelectronic sensor which acts as both the observer and picture processor. This development called the Optoelectronic Instrumentation and Sensor System (OMS) works with microprocessors and commercial video cameras. It can in some areas replace the most important human sensory organ, the eye.

Among the important applications are the determination of geometric data, optical inspection, object recognition and positioning. The combination of electronic data processing installations with photographic systems is not new; however, the previously applied combinations were too expensive, both from the standpoint of money and manpower, for industrial use.

Also, the demands on sensors for industrial use are of a different sort. They must be able to identify parts in any position and angular orientation, optically determine parts errors, measure the surface area, position and angular orientation of parts, read clear text and bar codes, determine geometric sizes and measure the velocity of objects. These tasks presuppose very complex data processing systems.

In summary this means: Parts which are to undergo a large number of manufacturing steps are systematically, economically and automatically moved via transfer and processing conveyors into and out of a series of integrated, centrally-controlled machine tools which accomplish the complete manufacturing operation. A weak point in this automated chain, or machine-flow process, is the lateral and angular rigging of the parts in fixtures and chucks which of course must be carried out with millimeter accuracy.

With the system briefly described in the foregoing, the part's coordinates are calculated and presented directly to the CNC-robot control as position parameters.

9160
CSO: 3102/345

TWO FLEXIBLE WORKSHOPS UNDER DEVELOPMENT IN NORWAY

Paris INDUSTRIES & TECHNIQUES in French 20 May 82 pp 162-163

[Article by Alain Perez: "Toward the Factory of the Future"]

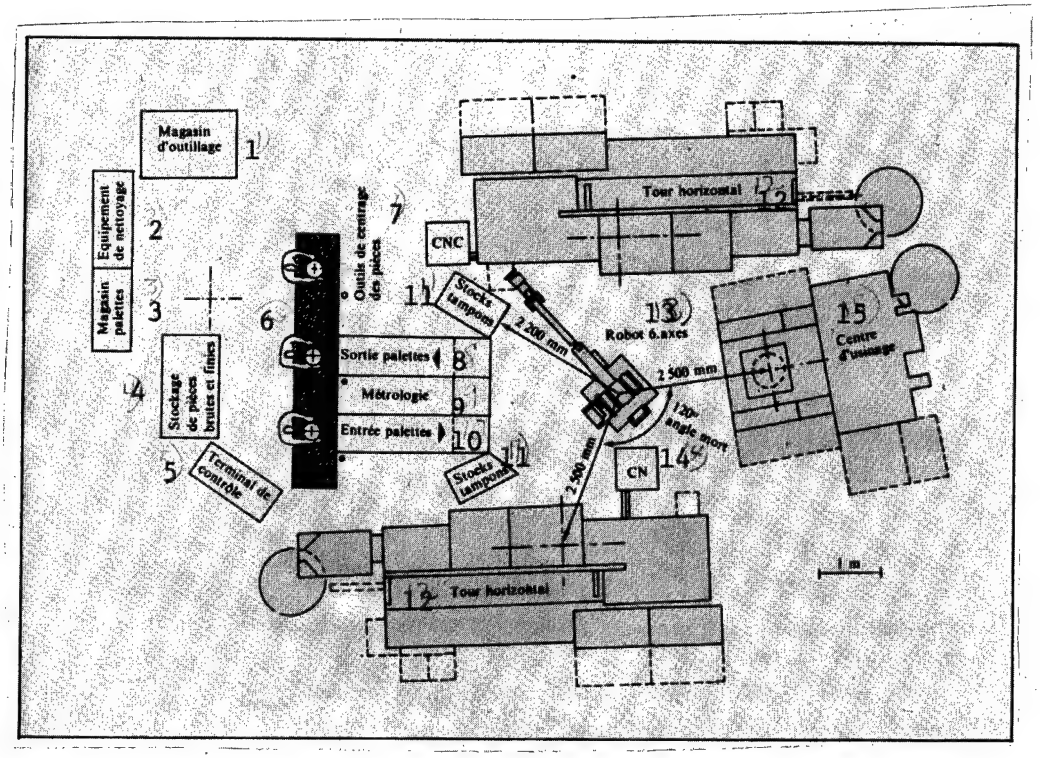
[Text] Highly diversified, small-scale production, with batches often totaling under 2,000 pieces and variations often numbering over 100, is a type of manufacturing that is very difficult to automate. Only a flexible system can be profitable. Two workshops of this type are being set up in Norway by Kongsberg Vaapenfabrik. Designed to manufacture component parts for aviation turbines and engines for American automobile maker Pratt and Whitney, they will be completed in 1983.

They were introduced in Paris at a two-day exhibition devoted to the "factory of the future." According to Richard L. Kegg, director of research and development at Cincinnati Milacron, a great deal remains to be done to improve the organization of production. Machinery is in fact used 8,760 hours a year on the average. However, in a traditional-type workshop, a part spends an average of 95 percent of its time going from one place to another, compared with only 5 percent on the machine! Furthermore, 3 of this 5 percent is devoted to unloading and loading operations!

As a result, only 2 percent of the total time results in real added value. The rest is lost in conveyance from one waiting station to another. According to studies made by the American firm, some component parts travel over 5 kilometers from workshop to workshop or machine to machine. The ICAMIC (Integrated Computer Aided Manufacturing in Cells) includes a Cincinnati HT 3 robot located in the center of the production unit. It serves seven working stations: two CNC horizontal lathes, a milling center, two tool shops, and the parts supply and shipping stations. Three manually operated preparations stations handle the assembly and disassembly of component parts on handling pallets (50 X 500 mm), which, once loaded, weigh some 90 kilograms. These heavy weights and the complexity of the trajectories require the use of the limited range robot. The latter has six axles and a range of action of 2.5 meters.

No Human Intervention

The robot can handle the part or tool support pallets equally well. Lathe work and milling follow a nonsequential cycle. The supplying of cutting tools on machines is done at the same time during milling.



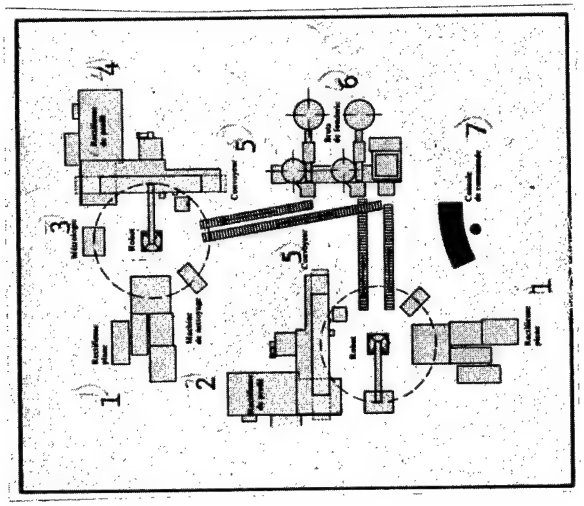
[Caption] ICAMIC Project: The robot serves seven work stations, including two CNC lathes, a milling center, two tool storage shops, and so on.

Key:

1. Tool supply shop
2. Cleaning equipment
3. Pallet storage shop
4. Rough and finished parts storage
5. Control terminal
6. Manual preparations stations
7. Parts centering tools
8. Pallet exit
9. Metrology
10. Pallet entry
11. Buffer stock
12. Horizontal lathe
13. 6-axle robot
14. 120° dead angle
15. Milling center

Developed in cooperation with the University of Trondheim, this unit is equipped with a data transmission system using optical fibers that are insensitive to electrical static. The turnings, of great value for recycling, are sorted and automatically recovered. The shop will operate with no human intervention. Anticipated improvement in productivity over a traditional solution is 40 percent. The second project, called RAMIGO (Robotics and Automated Measuring in Grinding Operations) is designed for the precision grinding of turbines for jet engines. It includes two identical milling cells fed by rough-cast metal. Each cell has a 6-axle Asea robot, with a span of 2 meters, whose precision of trajectory is $\pm$ .4 mm. These robots serve a contour grinder, a plane grinder, a measuring machine and a washing machine. The parts are carried on shuttle conveyers. An operator is in charge of supervising the unit. Productivity of this shop will go up 50 percent.

These two systems use computer software programs. In the RAMIGO unit, a central command post receives all information from the grinders (correct placement of parts and grinding), the robot (handling cycle) and the measuring machine (digital data). In the case of ICAMIC, an intermediary stage is assigned to individual control of operations. Every milling function thus has its own data processing. The whole unit is connected to the shop's central computer, which has five input/exits: control operator, printer, cassette, disc and plant management control.



[Caption] RAMIGO Project: governed by centralized computer system.

Key:

1. Plane grinder
2. Cleaning machine
3. Metrology
4. Contour grinder
5. Conveyer
6. Rough cast metal
7. Command console

With its graded data processing system, ICAMIC points the way to the factory of the future. The central computer receives three main entries: product needs with their specifications on a terminal screen, memory and data. It runs a drafting machine coupled to a fast printer and is also connected to secondary production management computers. A parallel infeed receives programming and delivery data. In the final stage, one finds automatic manufacturing with the robots and CNC machine tools. According to John Collinson, director of advanced research, this shop will manufacture parts within 24 hours of receiving the order.

11,464
CSO: 3102/366

FRENCH MINISTER INTERVIEWED ON INDUSTRIAL AUTOMATION POLICY

Paris LE NOUVEL ECONOMISTE in French 7 Jun 82 pp 74-75

[Interview with Pierre Gadonneix, director of metallurgic, mechanical, and electronic industries at the ministry of industry by Alain Jemain; date and place not specified]

[Text] The negotiations in recent months on robotics and industrial automation between some of the giants of U.S., European, and Japanese industry contain the seed of the alliances which will determine how the world markets will be split among about 10 big groups.

What is France's position going to be in this situation? Mr Pierre Gadonneix, 39 years old, a Harvard graduate, director of the DIMME [Directorate of the Metallurgical, Mechanical, and Electronics Industries of the Ministry of Industry], explains the new industrial policy.

Question: What lessons do you learn from the new American-Japanese maneuvers?

Answer: The initiatives taken in recent months show that the game isn't over yet. The Japanese and even the American industries are preparing to respond to the wave of "reindustrialization" of the western countries. The big decade for robotics will be from about 1985 to 1995, but decisions about investments and research have to be made starting right now.

I think that robotics will be organized around a dual market: on one hand, there will be highly standardized equipment, universal in application, that will not be very expensive--about 150,000 francs; and on the other hand, there will be more specialized types of equipment responding to highly specific requirements.

The first market, which will demand big investments, will be reserved for the large companies, who will be oriented to the world market. The second will probably remain the province of the PMI [Small and Medium Industries], as it entails a closer and more constant cooperation between the users and the developers of the equipment. I will add that this "made-to-order" concept in limited areas seems to me to be as important as the big assembly-line products. Japan now has about 130 businesses which specialize in this type of robotics for PMI.

Question: Doesn't international competition mean that some fairly powerful industrial poles will have to be created?

Answer: France occupies too modest a position for two reasons: the weakness of its industrial structures in mechanics; and also, the many obstacles still remaining that impede automation (small industrial investments, human and social pressures against automation). France needs to implement an active industrial policy in robotics, with strong state intervention, involving action in three areas:

a. In supply, concentrated around key target areas: assembly, arc welding, and automatic handling;

b. In demand, to favor the dissemination of robots and automatic machines both in PMI, by means of the MECA [Advanced-Design Machines and Equipment] procedures providing aid for the purchase of such equipment, and in large companies, through the CODIS [Steering Committee for the Development of Strategic Industries];

c. In support for obtaining foreign markets, particularly in Europe and North America.

Question: What are you doing to promote the national builders of both universal and standardized equipment, and the producers of "made-to-order" equipment?

Answer: In the first area, French poles are now being set up. Under the multi-year agreements between the nationalized companies and the government, the government officials are watching with very close attention to see what Matra, Renault, and the CGE [General Electric Company] will be doing in robotics. Some international agreements--such as those already signed between the General Handling and Storage Company, an Alsthom subsidiary, and Sankyo, between the Brittany Workshops and Construction Firm

and Osaka, between Renault and Ransburg, between the Wire Mills And Workshops of Commercy with Shin Mewa--seem essential to me, both to provide quickly products that meet the needs of the market, and also to ensure a better world coverage. In this regard, we are watching with special interest the negotiations in progress with Asea, Yaskawa, or Hitachi.

In the area of "made-to-order" equipment, we have just set up working groups for a number of sectors. For the moment there are eight of these groups (textiles, the clothing industry, the wood industry, furniture, plastic and rubber transformation, paper production, ceramics, leather and footwear), and they represent nearly 1.5 million jobs. They are trying to obtain a more concrete approach to the problems, by starting with the users. This should lead to automation contracts, as has happened with the flexible workshops. This would bring about simultaneously an expansion in supply, and an improved competitivity on the part of the users.

Question: What is the status of the various pilot projects?

Answer: In 1981 the CODIS approved ten project proposals representing a total investment of 407 million francs. These proposals cover the development of pilot automated flexible workshops (systems combining the advantages of large-scale production with the advantages of per-unit production), such as the Renault Industrial Vehicles facility at Boutheon, Peugeot S.A. at the Citroen plant in Meudon, the SNIAS [National Industrial Aerospace Company] and SAGEM [Company for General Applications of Electricity and Mechanics] in Bourges, Hagetmau-Option (Telemechanics) in Aquitaine for the wood industry. These pilot projects also involve development contracts between the government and the builders of industrial robots: the French Conveyers Company, the SCEMI [company for construction and upkeep of industriel material?] of the CEM [Electro-Mechanical Company] group, Afma-Robots (a subsidiary of Telemechanics and of Leroy-Somer), and Wire Mills and Workshops of Commercy. The state aid amounts to 110 million francs. About ten new project proposals are now being prepared.

Question: What is the record of the MECA procedures and of the efforts undertaken by the ADEPA [Agency for the Development of Automated Production], especially with the PMI?

Answer: In 1981, the 300 project proposals covered--half of which were for businesses with fewer than 50 employees--represented a total of 360 million francs in investments. The subsidies--ranging from 5 to 20 percent of the amount of the operation--came to 60 million francs. This year, about a thousand project

proposals should be dealt with, involving investments of 800 million francs that will benefit from substantial government subsidies.

Question: How can the PMI be persuaded to turn to automation?

Answer: The ADEPA has successfully set up a free system which offers assistance with decision-making. About 50 engineers and technicians are available to work with the investors. There will be 150 by the end of 1984, working between Montrouge and about ten regional centers. But let me insist on one point: they are catalysts and not consultants.

The total of the investments made by French companies in advanced design equipment came to 3.5 billion francs in 1980. Our goal is to reach a figure of 7 billion before the end of 1983.

Question: Will French robots make robotics accepted more readily in France?

Answer: The reactions of the unions and the employees in companies which have been automated do show that automation is accepted more willingly when the equipment used is of French origin. Between now and 1984, we hope to be able to reduce the flow of imports so that they will then represent no more than half of the domestic market (imports now account for 60 percent of our domestic market).

7679
CSO: 3102/357

GENDRON MANUFACTURES CNC GRINDING MACHINE

Paris INDUSTRIES & TECHNIQUES in French 1 May 82 pp 69-72

[Article by Andre Larane]

[Text] This machine, the offspring of numerical control (NC) applied to external cylindrical gringing, brings France on a level with its strongest foreign competitors in the grinding of rotating parts.

Tests show an 80 to 90 percent time reduction compared to standard grinding, due to the elimination of manual adjustments, and to automated part presentation and loading. But this is not all. Quality reliability is improved through automatic correction of the table's taper or parallelism imperfection, with each modification of the center-to-center distance. In this respect, CNC guarantees a tolerance of 10 microns over 500 mm.

At the same time, NC markedly reduces work-in-progress. A shaft with several diameters to be ground can be used as a general example. In standard operations, the machine is set for a given diameter; the operator grinds all the batch parts on that basis before changing the setting. With NC, thanks to automatic diameter calibration, each part is completed in one pass. The first part of a batch is thus immediately available for sending into the production line.

The flexible program system combines several procedures perfected and patented by Gendron: analog calibration gauge, automatic center-to-center distance adjustment by means of a computerized tail stock, and automatic changes in the part hold-down. Operational since the beginning of the year, this last device makes the machine universal: it eliminates the need to manually adapt part mounting for each new batch.

A gate-hoist for parts presentation completes the automation sequence. The Villeurbanne manufacturer obtains total flexibility by reducing parts changing time to less than one minute, through the use of a perforated ribbon to adjust the gauge, a digitalized tailstock, and the part mounting. These performances are very efficient for repetitive small and medium-size series, in flexible fabrication lines.

Displacements of 0.5 Microns

The computer itself is adaptable to centralized shop control by means of a distributed intelligence system. Mr Daniel Molle, in charge of methods, states that "as early as 1979, when we decided to go with digital control, we aimed for maximum automation and flexibility. There was no question of digitalizing each grinding set-up one after the other. Today, the goal has been reached."

For standard cylindrical grinding, the spark time during which the grinder operates does not exceed 6 to 10 percent of the total. With the exception of specialized grinders for large series, the improvement in this rate applies to digital control despite the difficulties in adapting the mechanical aspect. The idea is to move the carriage 0.5 microns at a time, which calls for particular attention to axis control, ballscrews, direct current motors, slides, and other components.

Unlike standard machining, the computer must be coupled to the calibration gauge so as to correct for the irregular wear of the grinding wheel. In straight feed, the wheel approaches the part, then switches to work feed, roughing, semifinishing, and finishing, and then withdraws. During the operation, the gauge grasps the midpoint of the part to be ground.

For the first CN machines as for standard models, a Marposs electronic comparator continuously measures the diameter. As soon as the desired dimension is reached, the gauge causes the sequence to be interrupted. To avoid the tedious calibration of the comparator, the manufacturer has chosen a Heidenhain analog self-calibrating gauge--or electronic micromenter. The exact dimensions are stored in memory while the grinder feed program, as a precaution, prepares a longer run than necessary. The gauge adapts to the various diameters and lengths of the segments to be ground, as long as it is positioned at their midpoint. For this it must travel along the part.

It is necessary to periodically regenerate the wheel by removing a layer of abrasive with a diamond tool mounted on the tailstock or the bench. This operation is included in the machine's flexible program cycle. Thanks to its circular interpolation capability, the computer can even guide the diamond dressing of complex profiles.

Mr Molle told us that "we nevertheless regret that we have not yet found a French manufacturer which is able to provide both this circular interpolation as well as the control of sequences by means of gauge signals."

Gendron had to work with CECN-Industrie (Villeurbanne) on Siemens or Elsag (San Giorgio) consoles. They devised the possibility of connecting them to a central management computer. This should not be confused with DNC (direct numerical control), where a central memory sends each machine's program sequence by sequence. Here, the computer sends the programs to the various numerically controlled machines at a single stroke, thus remaining available to monitor fabrication.

With each batch change, the center-to-center distance is adjusted, after clearing the tailstock. On standard equipment, the operator positions the new part and checks the tapering during infeed. He makes corrections by adjusting the two superimposed tables, one of them sliding and the other one pivoting. For the sake of automation

and speed, the manufacturer has devised a tailstock carriage controlled by the computer. Its sole moves along the pivoting table. Moved by a direct current motor and a simple trapezoidal screw, it is guided by two preloaded needle slides which ensure parallelism. But eliminating calibration and automatically setting the tailstock still did not eliminate manual handling when switching batches. There remained the crucial part grasping problem, the Achilles' heel of flexibility.

Part Holder for All Parts

Normally, the head supports the part a collector a front driver. A change in diameter means a change of collet. In some extreme cases where the part is to be ground from one end to the other, and offers no grasp hole or groove, the worker still has to turn it over. Engineers at Villeurbanne therefore sought and found a procedure applicable to all conceivable parts. This accomplished, it was easy for them to connect it to the CNC.

The head and the tailstock each have a two-jaw chuck and a retractable center. At the start, the part is supported by the jaws of the chuck and compressed by the center of the tailstock. Later, the jaws of the latter grasp the part. At the same time, the jaws of the head chuck open and a center moves up against the face of the part.

The first unit of this machine will soon go into service at Leroy-Somer.

Thus reassured as to its external grinding abilities, the Rhone river company is now tackling the internal grinding market with a four-wheel machining center, mounted on a rotating platform, to grind several concentric bores on a single part. Some machine-tool manufacturers definitely keep their talents well-hidden.

11,023
CSO: 3102/326

PUK-HERCULES JOINT PRODUCTION OF CARBON FIBERS

Paris CHIMIE ACTUALITES in French 14 May 82 p 3

[Unsigned article]

[Text] The potential for industrial scale production of carbon fibers in France has grown significantly in the last few weeks: following confirmation of the Elf Aquitaine-Toray Industries project (see p 2 of our 30 April 1982 issue), the PUK group and the American company Hercules announced that they had received a green light from the government for their own project (see p 9 of our 29 January 1982 issue).

The European Company for Fibers and Composites (SEFC) will build its carbon fiber unit, with an initial production capacity of about 200 t/year, at Pont-de-Claix (Isere), a well-known site for French chemical production.

The actual creation of SEFC is an outcome of the official approval granted by the French government (which has worked hard to create a French carbon fiber industry) for the project of the two companies, a project that will provide jobs for some sixty persons starting in late 1983.

As was stated at the end of last year, and despite the "replacement" of Hexcel by Hercules at the time, SEFC plans to "subsequently develop its impregnation activity, and eventually its activities in other products derived from carbon fibers."

Also as planned, Sumika-Hercules, joint subsidiary of Sumimoto Chemical and Hercules, will supply the French plant with the precursor (polyacrylonitrile) from Japan, "until the development of the fiber market allows PUK and Sumika-Hercules to build a precursor plant in France," the PUK announcement adds.

At this point, some reservations have been expressed about the possibility of each of the groups (PUK-Hercules on one hand, and Elf-Toray on the other) to build a polyacrylonitrile plant in France, as they have said they intend to do.

The investment for the Pont-de-Claix unit is estimated to be some 12 million dollars.

The turnover of the plant would be 60 to 90 million francs per year.

Directly concerned by the French projects, which threaten its future position as European leader in carbon fibers, the British group Courtaulds has stated that it intends to maintain its position on the world market and that it will increase its production capacity to 260 t/year at the end of this year.

Courtaulds currently claims 10 percent of the world market for actual fibers, and 30 percent of the precursor market. The British group would negotiate the creation of a joint subsidiary with another United States company.

11,023
CSO: 3102/334

FUTURE STRATEGY FOR FRENCH MACHINE-TOOL INDUSTRY OUTLINED

Bern TECHNISCHE RUNDSCHAU in German 8 Jun 82 p 16

[Article: "French Machine-Tool Industry on Threshold of Change"]

> [Text] The French machine-tool industry has suffered several serious recessions in recent years. The Government has laid out a plan for 1982 to bring the machine-tool industry once again up to the level of other industrialized European countries with appropriate investments.

This recession had several causes:

--Decreasing investment in facilities, which were lower last year than the already unsatisfactory level of the previous year.

--Uncertainties of all kinds which taxed the market, excessive interest rates for example.

These factors caused the companies to postpone refurbishing and modernizing their facilities until better times. The French Government now believes that through a policy of continuing support with investment credits it can induce the industry to change its policy.

A Strategy for the Future

The strategy of the French machine-tool industry focuses on increasing its share of the home market. In the meantime, it has been successful in defending--and in certain cases even improving--its position in foreign markets. Today, an average of 46 percent of production is destined for export, and 80 percent of this goes to industrialized countries. In spite of the investment crisis, the French machine-tool industry is determined to expand its efforts in technology and to advance new processes and techniques such as numerical control and automation with the aid of electronics. The government's investment plan, which spans 3 years, provides in particular for doubling French production with accelerated development in the area of numerically controlled machines. Considered as priority high-technology machines are the following:

--Heavy machines (boring and milling machines, large lathes).

--Certain "catalogue" machines: milling machines and lathes with numerical control, machining centers, grinding machines and for chipless forming die bar-bending machines and cutting equipment with numerical control.

Radical changes

In order for this plan to bear fruit at all, certain provisions are required:

--Restructuring and reorganizing the machine-tool industry.

--Execution of a technological renovation program: Multiyear contracts in the area of collective research. With a total amount of Fr 200 million, 3 national technological centers and several regional extension centers shall be created.

--To further support investments, the loan for robotics--Fr 1.2 billion in 1981--will be increased.

--To renew and modernize the entire French machine-tool inventory, the procurement of new machines and equipment will be supported, especially for small and medium-sized companies.

--The government itself will disburse over the next 3 years Fr 1.2 billion to procure modern material and machines for teaching institutions to ensure better training in this new technology.

The expenditures for this investment plan to be spread over 3 years totals Fr 4.0 billion. Half of this amount will be raised by the companies themselves, while the government will provide its portion through supplementary contributions in various forms, especially loans.

Well-Known Names and Highly Specialized Companies

The French manufacturers of machining centers are Adam, CNC Systems, Cit-Alcatel, Graffenstaden, GSP, H. Ernault-Souma, Line, Sagem, TMI and Vernier. Small and medium-sized firms are taking a great interest in automation since it makes it possible for them to lower their manufacturing costs and to maintain their competitive capability. Many firms manufacture highly developed machines which are often equipped with numerical controls:

--Machining centers and automatic turning centers with numerical control: Berthiez, H. Ernault-Souma, Graffenstaden, Manurhin Automatic, Ramo, Sculfort and Supemec;

--Milling machines and milling units: Dufour Industries, Hure, Rouchaud and Lamassiaude, Wirth and Gruffat;

--Boring and milling machines: Supemec;

--Punch presses: Bombled Industries, Profel;

--Punch presses and notching machines with automatic pallet changers: Dimeco, Alipresse;

--Punch and shear units for working angle iron: Vernet Industries;

--Power breaks: Promecan and Sagita-Manurhin;

--Grinding machines with programable controls: SIT and

--French machine-tool companies which make special machines for the automobile industry: Acma-Cribier, Adam, Citroen, Clement, CMV, Crouzet, Dubus, Graffenstaden, Line, Mavilor, Methodes et Usinages, Polymatic, Polymecanique, Renault, Rouchaud, Schlumberger, Someloir, Supemec, Wirth and Gruffat.

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USE OF ROBOTS INCREASING IN AUTOMOBILE INDUSTRY

Leinfelden-Echterdingen DIE COMPUTER ZEITUNG in German 19 May 82 p 21

[Based on an article by vwd correspondent Dietmar v. Lachges: "Robots in the Automobile Industry--Mainly Used for Welding and Painting"]

[Text] With respect to the use of robots, the European automobile industry is among the world's leaders. In recent years it has progressed markedly, and this manufacturing technology has encompassed more and more aspects of automobile production.

This year Daimler-Benz, for instance, will increase the number of over 80 robots presently in operation to more than 200. These robots, which have so far been used mainly for welding the overall body together from sheet metal parts and in the area of surface coating, are employed particularly for new Mercedes passenger car models.

It was stated that employment would not be affected by this equipment, because it is used instead of inflexible special machinery, e.g., multiple-point welding equipment. Also, total automation in the automobile industry was not in sight. Problems were still encountered in the use of robots during final assembly. However, this represents an area that is wide open yet, because 40 percent of the time of manufacture is spent assembling parts.

13,000 Robots Working on Automobiles Worldwide.

At present, about 2,000 industrial robots are in operation in the Federal Republic of Germany, 1,200 of which are used in the automobile industry. Worldwide the number is assumbed to be 22,000, with 13,000 of those working in the automobile plants.

In the field of welding technology the development toward automation has been concluded to a large degree. Presently the emphasis is on painting technology, in particular. The technological standard of German industrial robots is considered to be among the world's highest. Manufacturers include IWKA, VW, Jungheinrich, Nimak and Elac.

The costs of a six-axes industrial robot (of 30 to 100 kg capacity) range from DM 160,000 to DM 250,000.

VW Standing on its own Feet

VW manufactures its own industrial robots which are tailored to the specific requirements of its own manufacture. Recently a licence agreement between Volkswagenwerk AG and General Electric was concluded with respect to the manufacture and sales of VW industrial robots in the North American market.

According to a VW spokesman it is hard at this time to estimate the extent to which VW robots are applied in America. He stated that the market would have to decide that question.

Presently some 570 robots are in operation in the various VW plants, about half of them in the Wolfsburg headquarters.

It is planned to increase the number of robots at VW to approximately 800 this year. Presently the emphasis is on installing these robots in the Ingolstadt and Neckarsulm Audi/NSU plants. Their tasks are mainly welding and handling tasks. According to experts, the costs of such a robot range from DM 120,000 to more than DM 200,000 depending on performance and design.

BMW also has plans to increase the number of robots in operation to about 300. This includes units which have been further developed according to BMW ideas. At Opel only some 40 units are in operation today. At Ford-Germany the number is supposed to increase to more than 230 by year's end; more than 50 percent of those are in operation in the raw sheet metal stage. In 1979 the number was only seven.

In summary it should be noted that the major pushes for automation coincide with the introduction of new models.

9544
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BRIEFS

NEW MACHINE-TOOL STRUCTURE READY--The new pilot structure of the machine-tool industry is ready, at least on paper. A holding company with a capital of 250 million francs will be formed by the IDI [Industrial Development Institute] (35 percent) and all the large industrial groups interested (SNIAS [National Industrial Aerospace Company], SNECMA [National Corporation for Aircraft Engine Design and Construction], Dassault, Renault, Peugeot S.A., Alsthom-Atlantique, Creusot-Loire, Sacilor, and Usinor). This company will encompass two different units. One will specialize in milling; this will include Line S.A. (Albert) and TMI (Capdenac). The other will specialize in lathe work; this will combine at Saint-Etienne Berthiez and Saint-Etienne Machine-Tools. No layoffs are planned in the plants affected, but transfers and reconversions will be made to other units belonging to some stockholders. The program of commercial investments (subsidies abroad), industrial investments (complete renovation of the line of products), and technological investments (8 to 10 percent of sales to be put back into research) will require spending 1 billion francs a year for 3 years. [Text] [Paris LE NOUVEL ECONOMISTE in French 7 Jun 82 p 85] 7679

ELF-TORAY CARBON FIBERS--As we had indicated in our issue of 16 April (p 1), the ELF-Aquitaine (SNEA) construction project for a carbon fiber unit in the southeast of France has just been confirmed by the nationalized company; it will be built between Pau and Orthez, together with the Japanese company Toray Industries. The latter will hold 35 percent of the capital of a joint subsidiary in which SNEA will have 65 percent of the shares. But as some--beginning with one of the vice-presidents of Union Carbide itself--had hinted, the American company withdrew from the negotiations during the last phase. The official Union Carbide communique announcing this decision states that the company will continue to sell in Europe its own Thornel carbon fibers through the intermediary of Union Carbide Europe. The group produces fibers in the United States through two different precursors, at a rate which will exceed 600 t/year. The SNEA unit, with an initial capability of 300 t/year should start in 1984, with about 100 employees. Given the predictable (and rapid) development of the market, a decision could soon be reached about the second phase of the project, which will at the same time double the fiber production capability, and involve the construction of a precursor unit (PNA). This makes it possible to expect an effective doubling of the initial capacity around 1986/1987. The preliminary agreement having been reached between Elf-Aquitaine and Toray Industries, the final one could be signed in the fall, when the government in particular, will have specified the conditions under which it will support this large investment. The French unit should supply the whole European Common Market. [Text] [Paris CHIMIE ACTUALITES in French 30 Apr 82 p 2] 11,023

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ALFA ROMEO MODULAR ENGINE CUTS FUEL USE BY A QUARTER

Milan SCIENZA & VITA NUOVA in Italian Jun 82 pp 93-95

[Article by Paola de Paoli: "Two Burn Less"]

[Text] With the "modular" engine it is possible to reduce gasoline consumption in the city by one quarter: a not inconsiderable saving. Six months of "fleet" testing with the Alfa Romeo modular engine have demonstrated this. The results of the experiments have been highly successful, so much so that the system is already close to going into production on the Alfa Duemila model.

The system was designed and built by the firm of Biscione as part of the now completed CNR "Energy" project (subproject "Traction") and tested under the auspices of the EEC demonstration projects on energy conservation.

How It Works

As a new power system, the solution of the modular engine is to try to maintain power output at high levels, regulating power at steady engine speeds by varying the number of cylinders in use as a function of road requirements. Three possible methods of modulation were evaluated in the CNR/Alfa Romeo project: the fuel, the charge and the cylinders.

The modular engine developed by Alfa Romeo is equipped with an electronically controlled injection and ignition system (CEM) and it allows the power supplied to be regulated, not just with the normal throttle plates, but also by deactivating two of the four cylinders by blocking the injection of fuel into these cylinders. In this way, the overall output of the engine is noticeably increased when it is working at very light loads, which happens frequently in city traffic conditions.

The electronic control system consists of a series of sensors, which feed the information to a digital microcomputer, based on an 8-bit microprocessor, which transmits commands to three types of controls: Four electronic injectors for metering fuel; an electronically controlled coil for ignition advance and a control with a throttle plate opening to control engine rpm at idle.

The modular engine works with two or four active cylinders; the selection is made by an algorithm developed by Alfa Romeo during the completed CNR project and based on criteria for conserving fuel. Table 1 shows its features. In particular, it

can be seen that, when starting from rest, the 4-cylinder function is selected for reasons of drivability: under quick acceleration this function is retained until the driver shifts from first to second gear.

Milanese Taxi Drivers as Test Drivers

The major participants in the experiment were the professionals of city traffic, 21 Milanese taxi drivers from the Saccap cooperative, the test drivers responsible for 6 months--from July 1981 to January 1982--for a "fleet" of 10 taxis prepared on the basis of the body of the Alfetta 2.0L "America," which had already been prepared for the installation of fuel injection. This is a vehicle weighing about 70 kg more than the corresponding Alfetta 2.0 Lusso, with a carburetted engine, because of the various safety equipment intended for the United States, for example, the larger shock-absorbing bumpers, which were retained because they were considered useful in city driving.

Equipped with a base 2,000 cc engine, identical to the production version but fitted with the CEM system, painted in the traditional brilliant yellow, approved and registered as public vehicles, the automobiles were driven in Milan in the way shown in Table 2, with a tachograph to record the hours of operation, the type of journey made and the distance covered in kilometers. The microcomputer was installed so as to have interchangeable program memories: It made it possible to convert a CEM Modular vehicle into a CEM 4-cylinder in a few minutes.

As far as calculating fuel consumption was concerned--since no meter was available on the market which could register total consumption with the necessary accuracy--the classic system of filling the gas tank was resorted to: A formula which permits very accurate results over several refuellings and is sufficiently informative at a single fill-up, if it is carried out accurately.

The purpose of the experiment was to verify if the fuel savings identified theoretically and in laboratory tests could be reproduced in real city traffic, with different types of driving and in various weather conditions. The data gathered come, therefore, from a vehicle accustomed to standing in traffic for many minutes or to possible "spurts" above the 50 km/hour speed limit.

The "European cycle," which is carried out on a roller dynamometer for certification tests and which can simulate a standard city drive, would not actually have allowed particular factors to be taken into account--as was possible with the taxis--such as mixture enrichment when cold or the higher viscosity of the oil, which contribute to increased fuel consumption.

A computation of the reduction in consumption, taken from the results observed for individual months of the experiment, shows that a CEM Modular vehicle consumes 12.1 percent less than the CEM 4-cylinder vehicle: A saving that the Alfa engineers attribute to the "modular design." But, during the experiment, it happened that the modular taxis might have had a higher consumption that those with four active cylinders. Concerning problems with driving, the majority of the taxi drivers confirmed that it is possible to become accustomed to driving a modular vehicle in less than one week. The reliability of the system was proved by the fact that no particular problem came up during the experiment. When the two taxis with the modular engine,

which ran for 16 hours a day during the 6 months of the test--accumulating more than 40,000 kms of city use, equal to 2,000 hours of engine operation--were disassembled and examined at the conclusion of the experiment, they did not exhibit any differences in condition or use compared with the 4-cylinder vehicles. According to the engineers, this proves that the system of rotating between the pairs of active cylinders attained its objective.

The Results

In its electronically controlled version the modular engine allows savings of up to 24 percent in city driving. This is an important saving--states engineer Fillipo Surace, assistant general manger of Alfa Romeo Auto--without any reduction in the maximum performance of the vehicle. The system tested on the Alfetta has applications for the future, adds Surace: It could be extended to the Alfasud 1.5, with city fuel consumption figures on the order of about 7 liters/100 km , leaving today's performance levels untouched.

Even Greater Savings in the Future

Additional experiments, which are already under way, says engineer Aldo Bassi, director of research at Alfa Romeo Auto, hold the promise of further improvements without substantial modifications to the engine and with consequent improved savings: The realistic and not far distant "target" is a reduction in consumption of about 30 percent in city driving.

Altogether, the system cost 500 million lire in research and development costs: 385 million came from CNR financing in the 5-year project concluded last year (of which 56.88 percent went to the Institute for Mechanics of the University of Genoa and 43.12 percent to Alfa Romeo); 215 million as a demonstration experiment, of which 60 percent was borne by the manufacturing industry and 40 percent was financed by the EEC. A classic example--confirms Prof Giacomo Elias, director of the Completed Energy Project--of research that pays and where the innovative process, developed by industry and research agencies jointly, becomes profitable thanks to research: with a fair contribution from public financing, the role of which, Elias stresses, is to make the entrepreneurial "risk" acceptable.

To sum up, it is a race for innovation, in which Italian research and industry are today among the first in the world. The important thing is to keep pace. The outstanding example achieved is already a concrete prospect.

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